OBJECTIVES
The embedded systems are the heart of automatic devices in our daily life. The design of embedded systems represents an economical stake for manufacturers: it increases the value of equipments and improves the competitiveness of companies. France has several worldwide industries in aerospace, in military and space industry, in energy, in rail, in telecommunications, automotive etc., which have been users of embedded systems for decades: EADS, Thales, Airbus, Renault, etc.
The embedded systems major addresses the design, the implementation and the management of complex systems (aircraft, cars, trains...). The competences involved are the design of standardized and reliable functioning hardware and software devices/objects. The acquired knowledges cover the fields of electronics and software engineering at system level design.

JOB PROSPECTS
Equipement manager, system expert, project manager, embedded platform architect, embedded technologies expert/support manager, embedded applications architect, Software Development expert, Qualification/validation Expert, Test expert, integration expert/manager, process & methods/quality/certification expert.
## COURSE CONTENT

### SEMESTER 1

#### PROJECT-BASED LEARNING IN ELECTRONICS AND SIGNAL
- Analog electronics: signal conditioning, analog filter, power management
- Digital electronics: Microcontroller based sensor management, Bluetooth link
- Fourier series and transform, Sampling, digital filtering

#### NETWORK FUNDAMENTALS
- Network communication, Communication channel
- Layer approach, OSI model, TCP/IP model
- Network devices, Network addressing models

#### ELECTRONICS OF THINGS
- Deepening on Microcontroller
- Battery management, low power design, Power conversion
- Wireless link, protocols and capabilities low power
- Green communication design, System implementation.

#### DATA ACQUISITION AND PROCESSING
- Data types: qualitative, quantitative
- Deterministic data processing: Data transforms, filtering, linear prediction
- Random data processing: Distributions, estimation, measure errors; correlation...

#### ELECTRONIC MICROSYSTEMS
- Instruction set architecture
- Logic design, Computer arithmetic
- CPU design, Memory hierarchy
- Multicore and GPU models

#### COMPUTER MICROSYSTEMS
- C language programming: Memory allocation, Pointer and API
- Operating system description: process/thread/memory/supervision, shell & system programming

#### MANAGEMENT TRAINING
- Economics principles, Intercultural relations
- Corporate organization, International sales

#### ENGLISH LANGUAGE COURSE

### SEMESTER 2

#### RADIOFREQUENCY SYSTEMS:
- Radio wave transmission and propagation
- Design of RF systems
- Advanced topics in RF systems

### SEMESTER 3

#### DATA ACQUISITION AND PROCESSING
- Data types: qualitative, quantitative
- Deterministic data processing: Data transforms, filtering, linear prediction
- Random data processing: Distributions, estimation, measure errors; correlation...

#### SAFETY AND RISK ANALYSIS
- Failure trees – failure density, failure rate.
- Reliability of components, of boards, of systems, life duration, physical failure analysis - methods and tests.
- Redundant systems, serial, parallel, vote, triplication.
- Coded systems.
- Standards on quality, standards on safety.
- Electromagnetic compatibility of systems.

#### MANAGEMENT TRAINING
- Economics principles, Intercultural relations
- Corporate organization, International sales

#### PROGRAMMING LANGUAGES AND COMPILERS/FORMAL APPROACHES
- Abstract Syntax Trees
- Compilation algorithms
- Proof of program properties, model-checking
- Typed programming languages, lambda calculus

### SEMESTER 4

#### MANAGEMENT TRAINING
- System model, state space, optimum command theory
- States representation
- Reliability of components & cards

#### FRENCH LANGUAGE COURSE
- Medical Robotics
  - Kinematics of medical robots
  - Imaging guided medical robots
  - Tracking and surgical navigation

#### INTERNSHIP
The internship with an international company will enable students to display valuable professional skills and attitudes developed during the three academic semesters. ISEP will help you in finding an internship. Companies usually give a stipend to the trainees.

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Syllabus: subject to modifications